

APPENDIX A

Thermal Units, 30 MW and above, Installed
in India Since 1950

Sl. No.	Unit Size MW	Parameters at Turbine Stop Valve	Name of Station	No. of units.
1	2	3	4	5
1.	30	60 kg/cm ² 482°C	Calcutta (CESC)	2
2.		do	Basin Bridge	2
3.		do	Khaperkheda	3
4.		do	Korba	3
5.		do	Durgapur W. Bengal	2
6.		do	Paras	1
7.		do	Ahmedabad	2
8.		do	Harduaganj	2
9.		70 kg/cm ² 488°C	Delhi 'C'	1
10.		60 kg/cm ² 482°C	Harduaganj	1
11.		do	Amarkantak	2
12.		do	Nellore	1
13.		70 kg/cm ² 485°C	Kanpur	2
14.		60 kg/cm ² 482°C	Parli	2
15.		66 kg/cm ² 482°C	Gauhati	1
16.	50	60 kg/cm ² 482°	Bokaro	3

Appendix

1	2	3	4	5
17.		90 kg/cm ² 535°C	Neyveli	6
18.		do	Calcutta (CESC)	2
19.		do	Korba	4
20.		90 kg/cm ² 535°C	Patratu	4
20. A		do	Obra	5
21.		96 kg/cm ² 535°C	Harduaganj	2
22.		90 kg/cm ² 535°C	Barauni	2
23.	60	88 kg/cm ² 510°C	Kothagu-dam	4
24.		90 kg/cm ² 535°C	Ennore	2
25.		do	Harduaganj	2
26.		do	Delhi 'C'	1
27.		do	Faridabad	2
28.	62.5	88 kg/cm ² 510°C	Trombay	3
29.		do	Dhuvaran	4
30.	62.5	88 kg/cm ² 510°C	Delhi 'C'	3
31.		do	Paras	1
32.		do	Satpura	5
33.		do	Talcher	4
34.		do	Renusagar	2
35.		do	Bhusawal	1
36.		88 kg/cm ² 510°C	Ramagundam	1
37.	75	71 kg/cm ² 496°C	Durgapur W. Bengal	2
38.		do	do	1

1	2	3	4	5
39.	82.5	102 kg/cm ² 538°C	Bokaro DVC	1
40.		do	Durgapur DVC	2
41.		102 kg/cm ² 538/538°C	Bandel	4
42.	100	90 kg/cm ² 535°C	Neyveli	3
43.		do	Patratu	2
44.		do	Obra	3
45.		do	Badarpur Delhi	3
46.	110	130 kg/cm ² 535/535°C	Ennore	2
47.	110	130 kg/cm ² 535/535°C	Ennore	1
48.		do	Kothagudem	2
49.		do	Bhatinda	2
50.	120	126 kg/cm ² 538/538°C	Santaldih	2
51.		do	Koradi	2
52.		do	Chandrapura DVC	2
53.	140	125 kg/cm ² 538/538°C	Chandrapura	3
54.		do	Durgapur DVC	1
55.		140 kg/cm ² 540/540°C	Nasik	2
56.		126 kg/cm ² 538/538°C	Dhuvaran	2
57.	150	167.5 kg/cm ² 565/538°C	Trombay	1

APPENDIX B

Nuclear Power Stations in India under Construction and in Operation

1. Name of Station	Rajasthan Atomic Power Station	Madras Atomic Power Project	Narora Atomic Power Project	Tarapur Atomic Power Station.
2. No. of Units and size	2 × 220 MWe (gross)	2 × 235 MWe (gross)	2 × 235 MWe (gross)	2 × 210 MWe (gross)
3. Type of Station	— Pressurised heavy water reactors with on load refuelling			Boiling water type reactors
4. Fuel used	— Uranium dioxide (natural — uranium)			Enriched uranium
5. Moderator	Heavy water	Heavy water	Heavy water	Light water
6. Coolant	Heavy water	Heavy water	Heavy water	Light water
7. Steam pressure and temperature	— 41.06 kg/cm ² abs., 250°C	0.26% Wet,		32.35 kg/cm ² abs., 240°C
8. Cost of nuclear station	— Rs. 3300—5500 per kW — (installed) (1977)			Rs. 1300 per kW (installed) (1960)
9. Cost of fuel	— 2 to 2.5 paise/kWh		—	3 to 3.5 paise/kWh
10. In Operation/Under Construction	One unit in operation One under construction.	— Under construction		2 units in operation

APPENDIX C

Hydro Power Stations in India

(4 MW and above) as on 1-3-1978 (Statewise)

Name of Hydro Power Station	No. of units and capacity (MW)	Type of turbine	Head metres	Speed R.P.M.	Total installed capacity (MW)
1	2	3	4	5	6
<i>Andhra Pradesh</i>					
Nizam Sagar	2×5	Kaplan	18	250.00	10.00
Machkund	3×21+ 3×17	Francis	258	600.00	114.00
Upper Sileru	2×60	Francis	89	187.50	120.00
Lower Sileru	2×110	Francis	201	300.00	440.00
Nagarjuna Sagar	1×110	Francis	92	187.50	110.00
<i>Bhakra Beas Management Board</i>					
Bhakra R.B.	5×120	Francis	122	187.50	600.00
Bhakra L.B.	5×90	Francis	122	166.70	450.00
Ganguwal	2×24+ 1×29	Francis	28.34	166.70	77.00
Kotla	2×24+ 1×29	Francis	28.34	166.70	77.00
Dehar	4×165	Francis	282	300.00	660.00
Pong	4×60	Francis	65.5	166.70	240.00
<i>Bihar</i>					
Kosi	4×5	Bulb	4	93.80	20.00
Subarnarekha	2×65	Francis	133	300.00	130.00
<i>D.V.C.</i>					
Panchet Hill	1×40	Kaplan	25	250.00	40.00

1	2	3	4	5	6
Maithon	3 × 20	H. Francis	35	176.47	60.00
Tilaya	1 × 4	Kaplan	20	250.00	4.00
<i>Gujarat</i>					
Ukai	4 × 75	Kaplan	50	150.00	300.00
<i>Himachal Pradesh</i>					
Bassi	3 × 15	Pelton	335.6	500.00	45.00
Giri-Bata	2 × 30	Francis	147.5	428.60	60.00
<i>Jammu and Kashmir</i>					
Gandherbal	2 × 3 + 2 × 4.5	H. Francis	140	1000,600	15.00
Upper Sindh	2 × 11.3	Francis	158	500.00	22.60
Chenani	5 × 4.6	Pelton	366	600.00	23.00
Lower Jhelum	3 × 35	Francis	61.00	214.30	105.00
Mohora	2 × 4.5	H. Francis	120	600.00	9.00
<i>Karnataka</i>					
Shimshapura	2 × 8.6	Francis	192	600.00	17.00
Munirabad	3 × 9	Kaplan	42	214.30	27.00
Sivasamudram	6 × 3 + 4 × 6	H. Francis	128	375,600	42.00
Jog	4 × 18 + 4 × 12	H. Pelton	356	428.60	120.00
Bhadra	1 × 7.2 + 2 × 12 + 1 × 2	Kaplan Kaplan Francis	18,43,35	214.30, 250, 500	33.20
Sharavathi	10 × 89.1	Pelton	443	300.00	891.00
Tungabhadra	8 × 9	Kaplan	28.6	214.30	72.00
<i>Kerala</i>					
Idukki	3 × 130	Pelton	665	375.00	390.00
Sabarigiri	6 × 50	Pelton	710	500.00	300.00
Kuttiady	3 × 25	Pelton	643	500.00	75.00
Sholayar	3 × 18	Francis	306	750.00	54.00
Sengulam	4 × 12	H. Pelton	312	500.00	48.00

1	2	3	4	5	6
Neriamangalam	3×15	Francis	198	600.00	45.00
Pallivasal	3×7.5+ 3×5	H. Pelton	572	600.00	37.50
Poringalkuthu	4×8	Francis	176	214.30	32.00
Penniar	2×15	Francis	238	600.00	30.00
<i>Madya Pradesh</i>					
Gandhisagar	6×23	Francis	46	187.50	115.00
<i>Maharashtra</i>					
Koyna Stage I	4×60	Pelton	475	300.00	240.00
Koyna	4×75	Pelton	475	375.00	300.00
Stage II					
Koyna	4×80	Francis	123	214.30	320.00
Stage III					
Vaitarna	1×60	Francis	280	375.00	60.00
Khopoli	6×12	Pelton	525	300.00	72.00
Bhivpuri	6×12	Pelton	525	300.00	72.00
Bhira	6×22	H. Pelton	457	375.00	132.00
Purna	3×7.5	Francis	34	250.00	22.50
Bhatgar	1×16	Kaplan	36	214.30	16.00
Vir	2×4.5	Kaplan	36	214.30	9.00
<i>Meghalaya</i>					
Umtru	4×2.8	Francis	53	500.00	11.20
Umiam Stage I	4×9	Francis	149.35	600.00	36.00
Umiam	2×9	Francis	82.00	166.70	18.00
Stage II					
<i>Orissa</i>					
Hirakud I	2×24+ 4×37.5	Francis/ Kaplan	32	150.00	198.00
Hirakud II	3×24	Kaplan	22	150.00	72.00
Balimela	6×60	Francis	274	375.00	360.00

1	2	3	4	5	6
<i>Punjab</i>					
Shanan	4×12	Pelton	600.00	428.60	48.00
UBDC I,II,III	3×15	Kaplan	17.1	150.00	45.00
<i>Rajasthan</i>					
Ranapratap Sagar	4×43	Francis	50	125.00	172.00
Jawahar Sagar	3×33	Francis	35	120.00	99.00
<i>Tamil Nadu</i>					
Kundah I	3×20	Pelton	317	428.60	60.00
Kundah II	5×35	Pelton	714	428.60	175.00
Kundah III	2×60	Francis	259	375.00	120.00
Kundah IV	1×50	Francis	64	150.00	50.00
Kundah V	1×20	Francis	259	600.00	20.00
Mettur Dam	4×10	H. Francis	40	250.00	40.00
Mettur Tunnel	4×50	Francis	40	136.36	200.00
Periyar	4×35	Francis	386	750.00	140.00
Kodayar	1×60+	Pelton)	974,244	500.00	100.00
	1×40	Francis)			
Shoyalar	2×35+	Francis	379,143	750,428.6	95.00
	1×25				
Pykara	3×6+	Pelton	867	600.00	75.20
	2×13.6				
	+2×15				
Moyar	3×12	Pelton	372	428.60	36.00
Aliyar	1×60	Pelton	411.5	333.30	60.00
Sakarpathy	1×30	Francis	89	250.00	30.00
Papanasam	4×7	Francis	71	600.00	28.00
<i>Tripura</i>					
Gumti	2×5	Francis	42	333.30	10.00
<i>Uttar Pradesh</i>					
Matatila	3×10	Kaplan	26	250.00	30.00
Rihand	6×50	Francis	69	150.00	300.00

1	2	3	4	5	6
Obra	3×33	Kaplan	20.42	115.40	99.00
Khatima	3×13.8	Kaplan	18	166.70	41.40
Ramganga	3×66	Francis	97.25	187.50	198.00
Dhakrani	3×11.25	Kaplan	18.60	187.50	33.75
Dhalipur	3×17	Francis	30	150.00	51.00
Yamuna Stage IV (Kulhal)	3×10	Kaplan	18	187.85	30.00
Yamuna Stage II (Chibro)	4×60	Francis	99	250.00	240.00
<i>West Bengal</i>					
Jaldhaka	3×9	Francis	147	600.00	27.00

APPENDIX D

The Hydro-electric Potential in India

Region	Firm hydro potential In million kW at 60% load factor	In million kWh
Northern	10.73	56,500
Western	7.77	37,800
Southern	8.10	42,600
Eastern	2.70	14,200
North Eastern	12.46	65,500
Total (All India)	41.16	216,600

The hydro potential in India is estimated at 41 million kW of generating plant. So far about 7 million kW of generating plant has been installed and a further 7 to 8 million kW is under construction.

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